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GB 1542095 A US 4651956 A

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(54) Vent valve for hot air balloon

(57) A venting valve in a hot air balloon comprises a valve member (4) of parachute form located by constraining lines (6A) for closing an outlet hole (2) in the balloon envelope (1) and movable away from the hole (2), constrained by the lines (6A), to permit outflow of air from the interior of the envelope (1). A releasable locking mechanism (10) secures the valve member (4) to the envelope (1) to limit valve-opening movement of the valve member (4), the valve member (4) being freed for further valve opening movement upon release of the locking mechanism (10). In this venting valve, with the valve member (4) secured to the envelope (1) by the locking mechanism (10) the valve member (4) is prevented from moving clear of the effect of the outflowing air and hence from open condition is urged by this air to close again. The lines (6A) are sufficiently long to permit opening movement of the valve member (4) to a position clear of the effect of the outflowing air, allowing increased outflow of air, but such movement is only obtainable by release of the locking mechanism (10).

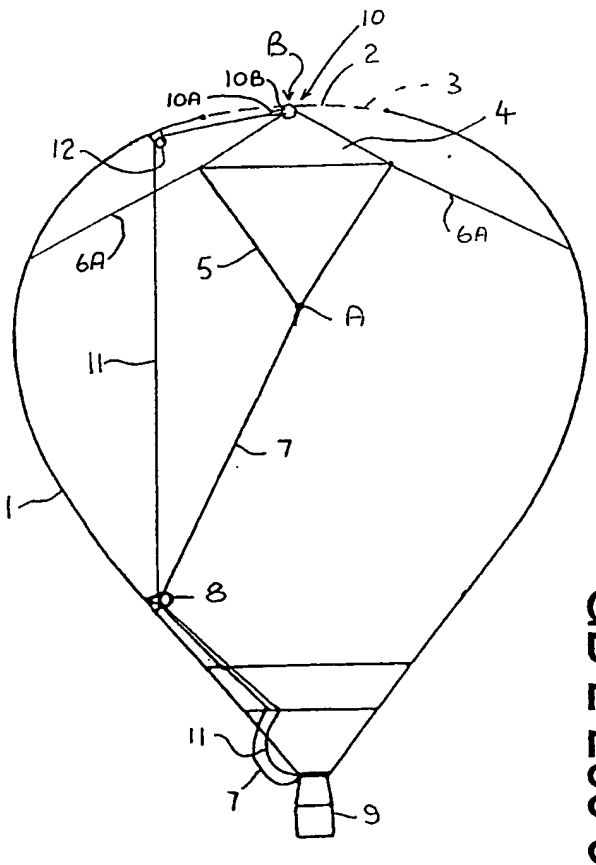

Fig.3

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1990.

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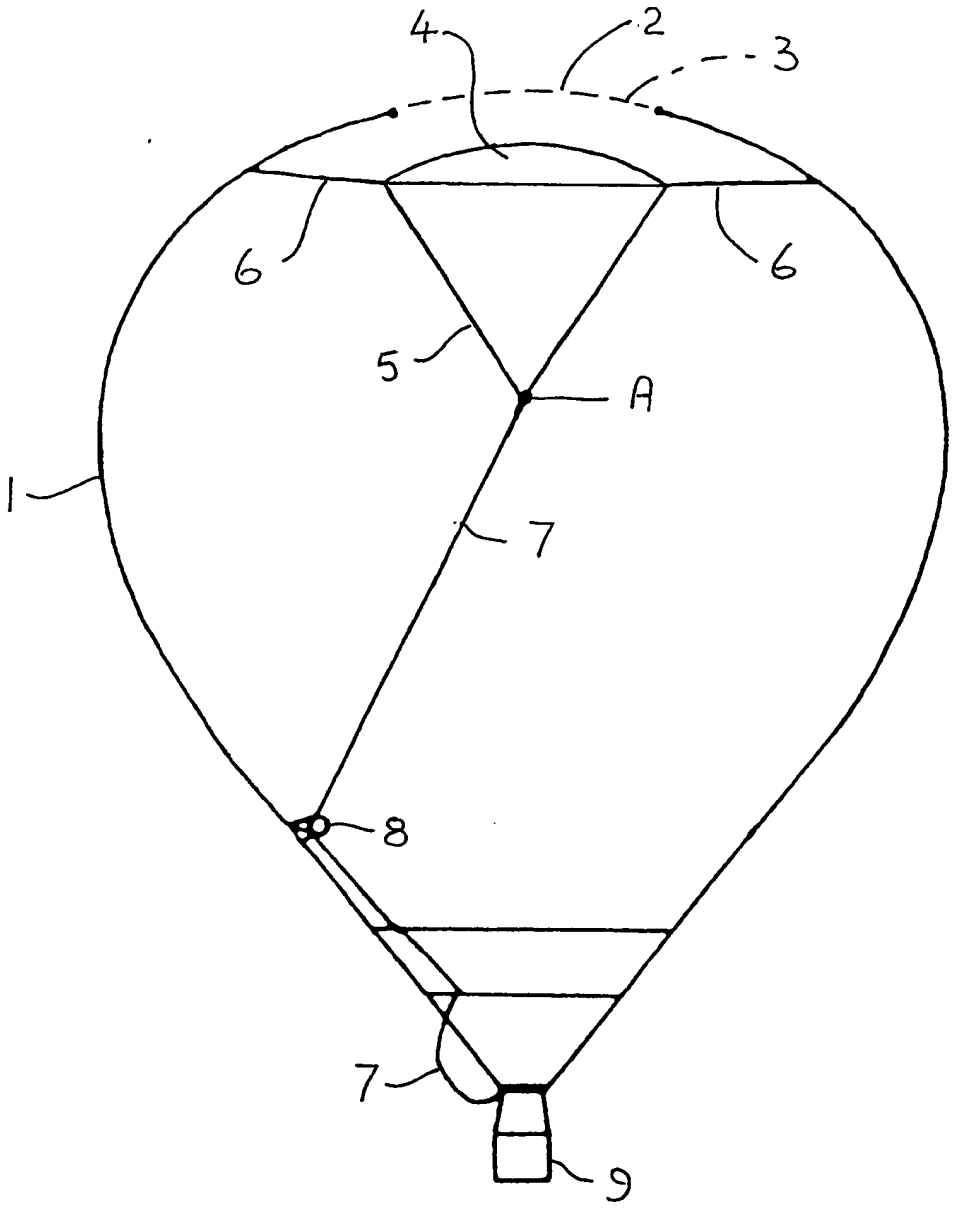

Fig. 1

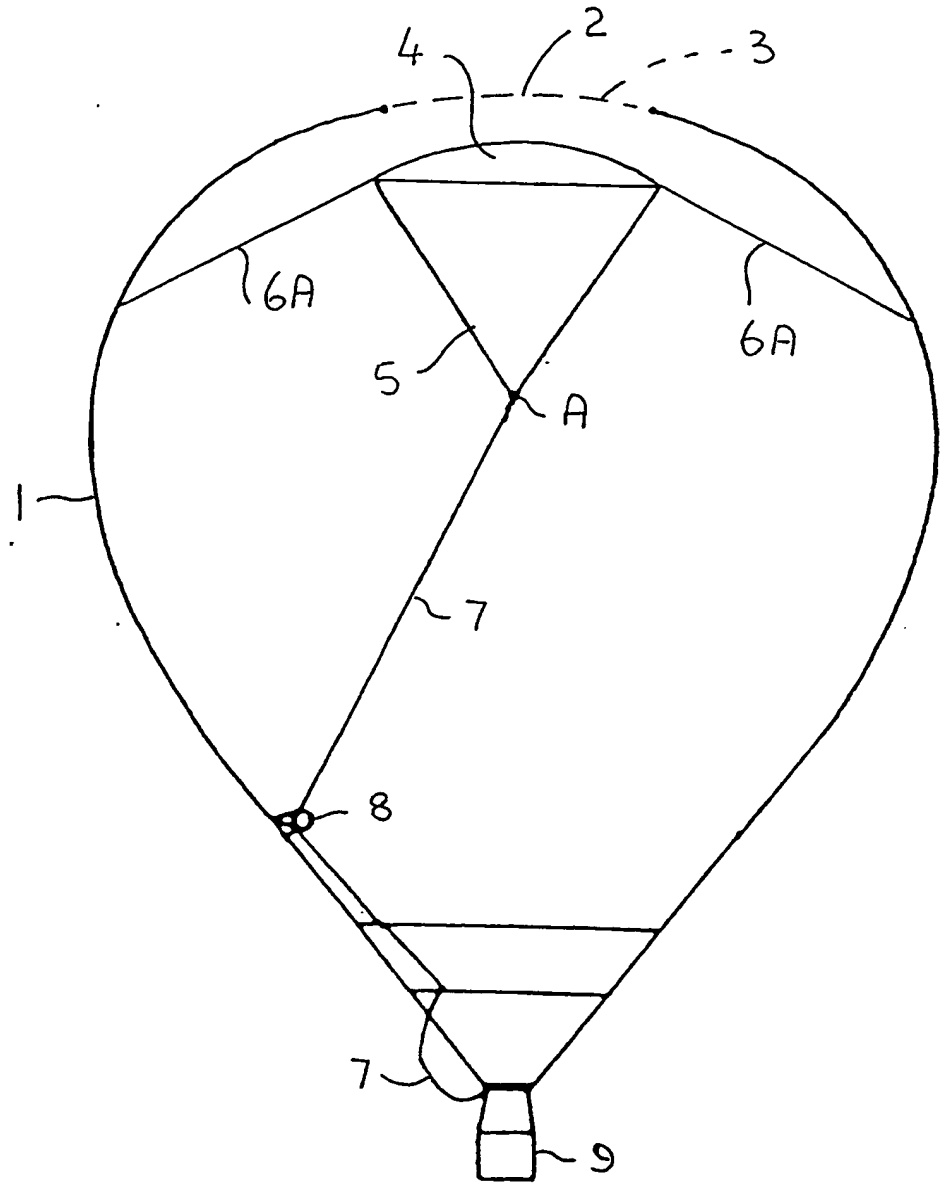

Fig.2

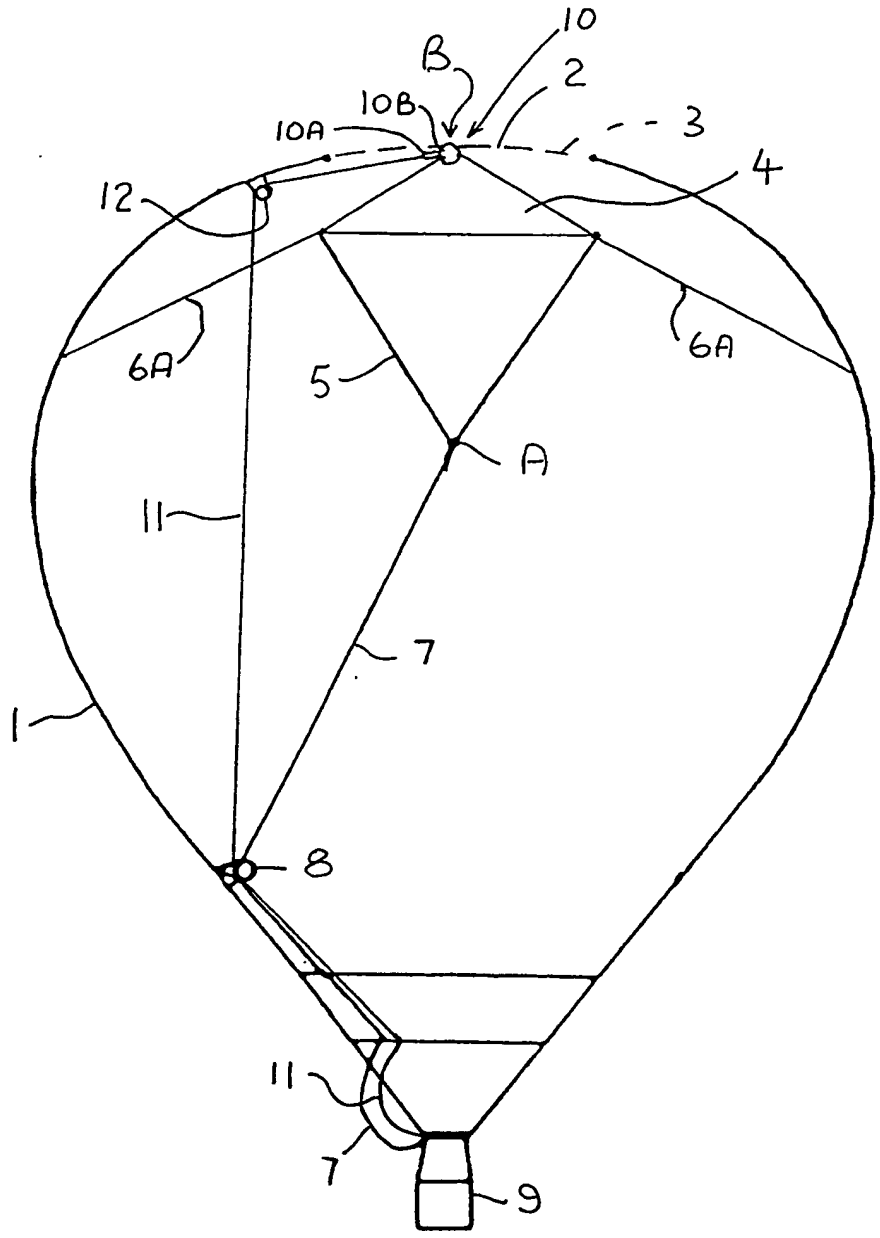

Fig.3

BALLOON VENTING VALVES

This invention relates to balloon venting valves.

Hot air balloons are provided with venting valves for venting the interior of the balloon to the exterior to permit a controlled escape of hot air from the balloon when desired by the pilot.

Referring to Figure 1 of the accompanying drawings, which is a schematic illustration showing the interior of an inflated hot air balloon, there is shown in this Figure a type of venting valve, known as a "parachute valve" used in hot air balloons. In the top of the envelope 1 of the balloon there is a circular outlet hole 2 traversed by tapes 3 which are secured to the envelope. With the balloon inflated the hole 2 normally closed by a valve member 4 in the form of a circular piece of fabric of larger diameter than the hole 2. Shroud lines 5 descend from around the perimeter of the valve member 4 to a point A so that the valve member 4 and its shroud lines 5 resemble a parachute.

The valve member 4 is held centrally with respect to the outlet hole 2 by centralising lines 6 attached to its periphery and to the envelope 1.

From the point A a control line 7 extends down to a guide pulley 8 carried by the envelope 1, from where it passes down to the balloon basket 9.

With the balloon envelope 1 inflated and the valve control line 7 released, the hot air within the balloon acts to hold the valve member 4 at the top of the envelope, closing the outlet hole 2. The valve member 4 is prevented from being expelled through the hole 2 by the tapes 3 traversing the hole. By pulling the control line 7 the pilot can pull the valve member 4 down partially or completely away from the hole 2, thereby to

allow a controlled amount of hot air to escape from the interior of the envelope 1. Upon release of the control line 7 the outflowing air causes the valve member 4 to return to its original position closing the hole 2.

As indicated above, the centralising lines 6 are necessary to ensure that the valve member 4 is held correctly located both to close the hole 2, and to be positioned when the valve is open so that outflowing hot air acts thereon to close the valve again when the control line 7 is released. However, the centralising lines 6 also limit the downward movement of the valve member 4, and hence restrict the amount to which the valve can be opened. If the centralising lines 6 are lengthened to allow greater valve member movement, for example as shown in Figure 2 which is a schematic view similar to Figure 1 but showing longer centralising lines 6A, they have to be attached at a lower level to the envelope 1. As a consequence when the valve is fully opened they may allow the valve member 4 to descend too far, so that it passes below the influence of the outflowing air and hence does not re-close upon release of the control line 7. This is dangerous as it might lead to inadvertent deflation of the balloon in flight.

Having regard to the desirable limitation on the length of the path of travel of the valve member discussed above, it follows that to achieve a desired rate of outflow of hot air, the outlet hole 2 and valve member 4 have to be made larger in diameter for larger balloons. As a result the valve member 4 becomes increasingly heavier to operate. If the diameter of the hole 2 and the valve member 4 are made smaller in a larger balloon, to lower the operating load, the valve can not then be opened sufficiently to achieve rapid deflation as required for a high-wind landing.

According to the present invention there is provided a venting valve in a hot air balloon comprising a valve

member of parachute form located by constraining means for closing an outlet hole in the balloon envelope and movable away from the hole, constrained by the constraining means, to permit outflow of air from the interior of the envelope, and releasable locking means securing the valve member to the envelope to limit valve-opening movement of the valve member, the valve member being freed for further valve opening movement upon release of the locking means. With this venting valve the constraining means can be such as to permit opening movement of the valve member to a position clear of the effect of the outflowing air (as described above with reference to Figure 2) since such movement is only obtainable by release of the locking means. With the valve member secured to the envelope by the locking means the valve member is prevented from moving clear of the effect of the outflowing air and hence operation in this condition is substantially as described with reference to Figure 1.

For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made, by way of example, to Figure 3 of the accompanying drawings which is a schematic illustration showing the interior of an inflated hot air balloon.

The balloon of Figure 3 is provided with a venting valve that is a parachute valve. To this end, and as already described with reference to Figures 1 and 2, there is in the top of the envelope 1 a circular outlet hole 2 traversed by tapes 3 secured to the envelope. With the balloon inflated the hole 2 is normally closed by a valve member 4 in the form of a circular piece of fabric of larger diameter than the hole 2. Shroud lines 5 descend from around the perimeter of the valve member 4 to a point A so that the valve member 4 and its shroud lines 5 resemble a parachute.

From the point A a control line 7 extends down to a guide pulley 8 carried by the envelope 1, from where it passes on down to the balloon basket 9.

As thus far described the venting valve is as described with reference to Figure 1. The balloon of Figure 3 also has centralising lines 6A holding the valve member 4 centrally with respect to the outlet hole 2, these lines 6A being long lines attached lower down in the envelope 1 as described with reference to Figure 2. To prevent the excessive downward movement of the valve member 4 which is made possible by the provision of the longer constraining lines 6A, in the balloon of Figure 3 the centre of the valve member 4 is secured by a releasable locking mechanism 10, at a point B, to the tapes 3 (and hence to the envelope 1). With the valve member 4 thus secured the amount by which the valve can be opened, as shown in Figure 3, by pulling the control line 7 is limited and it is thus ensured that the valve member 4 remains correctly located to be closed again, by the effect of the outflowing air, upon release of the control line 7.

On the other hand, if rapid deflation of the balloon is required, for effecting a high wind landing, the pilot by releasing the locking mechanism 10 is able to obtain the full movement of the valve member 4 permitted by the longer constraining lines 6A. The valve member 4 can be pulled well clear of the hole 2 to permit outflow through the hole 2 unobstructed by the valve member 4.

The locking mechanism 10 can be, for example, a mechanism that is released by pulling a spring-retained pin 10A from a block 10B, there being an operating line 11 running from the pin 10A to a guide pulley 12 carried by the envelope 1, from there down to a pulley mounted with the pulley 8, and from there down to the basket 9.

The outlet hole 2 and valve member 4 of Figure 3 can be made of a diameter such that reasonable effort only is required to open the valve to obtain satisfactory outflow of air during flight, and yet substantially greater outflow of air can be obtained at the conclusion of a flight by releasing the locking mechanism 10 and pulling the valve member 4 well clear of the outlet hole 2, as permitted by the length of the constraining lines 6A.

CLAIMS

1. A venting valve in a hot air balloon comprising a valve member of parachute form located by constraining means for closing an outlet hole in the balloon envelope and movable away from the hole, constrained by the constraining means, to permit outflow of air from the interior of the envelope, and releasable locking means securing the valve member to the envelope to limit valve-opening movement of the valve member, the valve member being freed for further valve opening movement upon release of the locking means.

2. A venting valve as claimed in claim 1, wherein the locking means includes an operating line running down to the basket of the balloon.

3. A venting valve as claimed in claim 2, wherein the operating line is connected to a pin spring-retained in a block, operation of the line to pull the pin from the block effecting release of the locking means.

4. A venting valve in a hot air balloon, substantially as hereinbefore described with reference to Figure 3 of the accompanying drawings.

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Examiner's report to the Comptroller under Section 17 (The Search Report)

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Relevant Technical fields

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Search Examiner
B F BAXTER

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASE: WPI

Date of Search
7 JULY 1992

Documents considered relevant following a search in respect of claims 1-4

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
A	GB 1542095 (CREVZET) note values 41, 43	1
A	US 4651956 (WINKER ET AL) whole document	1

Category	Identity of document and relevant passages	Relevant to claim(s.

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